May 18, 1973

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REPORT OF SOILS INVESTIGATION

FOR

PROPOSED WASTE MANAGEMENT
LANDFILL SITE

NEAR KANKAKEE, ILLINOIS

PREPARED FOR

GEOTECH, INC.

224 NORTH BROADWAY

JOLIET, ILLINOIS

BY

TESTING SERVICE CORPORATION

457 EAST GUNDERSEN DRIVE

WHEATON, ILLINOIS

MAY, 1973

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INTRODUCTION

This report covers the results of our investigation which was performed to determine the general soil conditions for a proposed sanitary landfill. The site is located on the east side of U. S. Route 52 approximately 5 miles south of Kankakee, Illinois.

The results of field and laboratory work and recommendations based on this work are included in this report.

FIELD INVESTIGATION AND LABORATORY TESTING

Eight soil borings were made for this study at locations which are indicated on a Boring Location Plan included in the Appendix of this report.

These borings were made using a truck-mounted or ATV mounted drill rig with the bore holes being advanced by hollow stem continuous auger flight

methods. Samples were taken according to currently recommended ASTM Procedures for Split Spoon Sampling of soils. A copy of the procedure which is entitled "Standard Method for PENETRATION TEST AND SPLIT-BARREL SAMPLING OF SOILS, ASTM Designation: D 1586-67" is included in the Appendix of this report. The Split Spoon sampler had an outside diameter of 2 inches, an inside diameter of 1-3/8 inches and a length of 2 feet. This sampler was advanced by driving with a 140-pound weight falling freely from a height of 30 inches with the penetration resistance being the number of blows required to advance the sampling spoon a distance of 12 inches after an initial driving of 6 inches has been used to seat the sampler. The penetration resistance or the "N" value is a measure of the softness or the toughness of a cohesive soil or the degree of density of a granular soil. The "N" value is, in general, related to the bearing capacity of the material.

Representative portions of the Split Spoon samples were placed in glass containers with screw-type lids and taken to the laboratory for further examination and testing. Laboratory work consisted of determining the water content of the cohesive samples, dry unit weight of selected samples and the unconfined compressive strength of suitable samples. Also approximate measurements of the unconfined compressive strengths were made for some of the samples using a calibrated pocket penetrometer. The pocket penetrometer is an indirect method for evaluating the compressive strength of a clay soil. Three samples were tested for permeability, and one was tested for ion exchange capacity. All samples were examined by a qualified soils technician with the field classifications being verified.

Water level observations were made during and at the completion of the drilling operation and at a minimum interval of twenty-four hours

thereafter. This water table information is indicated on each of the individual Boring Logs which are included in the Appendix of this report.

The penetration resistance values, water content data, unconfined compressive strength measurements, dry unit weights and soil descriptions are shown on Boring Logs included in the Appendix of this report.

DISCUSSION OF TEST DATA

The majority of the site was covered by 0.5 to 3.0 feet of topsoil. A portion of the east side of the hill has been stripped and was utilized as a borrow area. A small area near the top of the hill has been excavated and was used as a disposal site. The low area to the east and north of the hill contained a wedge shaped layer of loose sand below the topsoil. Below the sand was a layer of tough to hard silty clay. The clay layer appeared to be continuous over the entire site. The clay layer at some locations was found to be underlain by silt, sand or gravel before encountering refusal. The refusals could have been due to boulders but most are probably on the Niagaran Limestone bedrock. Boring 3 near the crest of the hill was extended to a depth of 101.5 feet without reaching refusal. The soils in the western portion of the site were variable. Several isolated lenses of sand or silt were sampled. The hill was composed of three generalized strata. A layer of silty clay was present below the topsoil. This was underlain by a relatively thick layer of silt. Below the silt was a wedge of sand which appeared to thicken to the south and west. The sand wedge was resting on the previously mentioned clay blanket.

The cation exchange capacity of sample 11 of Boring 6 was determined by the ammonium acetate saturation method. The cation exchange capacity was found to be 9.5 milli-equivalents of ammonium per hundred grams of soil.

Permeability tests were made on three samples from the borings. The results of the tests are tabulated below:

BORING NUMBER	SAMPLE DEPTH (in feet)	PERMEABILITY (K = centimeters per second)
2	16.0 to 17.5	9.4×10^{-8}
2	31.0 to 31.5	4.1×10^{-8}
3	68.5 to 70.0	1.1×10^{-7}

SITE GEOLOGY

This discussion is based on field observations and information obtained from PLEISTOCENE STRATIGRAPHY OF ILLINOIS by H. B. Willman and John C. Frye, Ill. St. Geol. Surv. Bull. 94 (1970).

The site can be divided into two areas on the basis of origin. The upland portion is an isolated section of the Ransom Moraine. The low-lying part of the site is the plain of former glacial Lake Watseka. The surficial wedge of sand was deposited on the lake plain. The moraine exhibits variation in composition which is commonly found in material deposited at the front of a melting ice sheet. The underlying layer consisting predominantly of clay is probably an older sheet of ground moraine.

The Ransom (or inner Marseilles) drift is included in the Yorkville Till Member of the Wedron Formation. This material was deposited during the Woodfordian Substage of the Wisconsinan Stage.

The composition of this material is as tabulated below (Willman and Frye, pp. 167 and 169):

UNIT	Matrix Grain Size (%)			CLAY MINERAL COMPOSITION (%)		
	SAND	SILT	CLAY	Expandable Minerals	Illite	Kaolinite & Chlorite
Yorkville Till Member	12	38	50	6	78	16
Marseilles	8	33	59	6	78	16

The bedrock in this area is dolomitic limestone of the Niagaran Series which was deposited during the Silurian Period. The rock was not sampled during the exploration, but it outcrops in the adjacent Iroquois River Valley.

Six cross sections which illustrate the spatial relationships of the soil strata are included in the Appendix of this report.

SITE HYDROLOGY

The water level readings in the borings indicate a relatively high surface water table. The results are tabulated below:

BORING NUMBER	(DEPTH IN FEET) WHILE DRILLING	AFTER BORING	24 HOURS
1	37.0	-	3.0
2	38.0	-	3.0
3	25.0	-	7.0
4	18.0	3.0	15.0
5	28.0	8.0	5.0
6	3.5	3.5	1.5
7	5.0	1.0	Covered
8	5.0	4.5	3.0

The 24-hour water level readings indicate that the zone of saturation in the low portion of the site is approximately 3.0 feet below the surface and that the zone of saturation in the upland portion of the site is from 7.0 to 15.0 feet below the surface. Because of the relatively high amount of precipitation in the past season these are probably near the high value of the normal range of fluctuation.

The surface drainage is toward a small intermittent stream east of the site. This stream flows to the northeast into the Iroquois River. The upland area of the site has a relief of approximately 40.0 feet, and the lower area has a relief of approximately 15.0 feet. The hydraulic gradient in the surface material should be toward the northeast generally parallel to the ground surface.

Records of some of the water wells in the surrounding vicinity were checked at the Illinois State Water Survey Office in Warrenville. The piezometric surface constructed from these records slopes down to the Northeast and is approximately 20.0 feet above the bedrock at the Northeast corner of the site. This indicates that the hydraulic gradient in the bedrock is upward toward the overlying clay. The map indicating the piezometric surface is in the Appendix of this report.

RECOMMENDATIONS

We are of the opinion that this site can be utilized as a sanitary landfill operation provided that proper planning is done and that the recommendations are conscientiously followed. A 10-foot thick layer of clay should be left below the bottom of the landfill to provide a relatively impermeable barrier to the migration of leachate. After the initial area has been opened, the bottom should be probed by auger borings to determine that the proper

thickness of clay is present. If the thickness of clay is found to be less than 10.0 feet, then the deficiency should be made up with compacted clay fill. The silty clays at the site are suitable materials for this use. The silty clay should be spread in layers not to exceed 9 inches loose measurement and each layer should be compacted to at least 95.0 per cent of the maximum dry weight that can be produced when the same material is compacted in the laboratory according to procedures outlined in "Standard Methods of Tests for MOISTURE-DENSITY RELATIONS OF SOILS USING A 10-LB. RAMMER AND AN 18-IN. DROP, ASTM Designation: D 1557-70." Where lenses of permeable soil are encountered in the side walls of the pit adjacent to property lines, these should also be covered with a 10-foot thick seal of compacted clay.

It is recommended that this site be operated in a hydrologically safe manner. Prior to beginning operation of the landfill, monitoring wells should be installed to determine the quality of the water in the bedrock and in the near surface sand wedge. The ground water should be sampled prior to the operation of the landfill to provide a basis for future comparison. A perimeter drain should be installed to intercept surface water.

A sand body is present in the subsurface at the Southwest corner of the site. This can be excavated by installing a temporary wellpoint system along the South and West margins of the property. The wellpoints should remain in operation as needed until the backfilling has reached a sufficient height to provide a surcharge which would prevent a rupture of the clay seal on the wall of the site. The sides of the pit will have to be sloped back to prevent undermining of the adjacent property. When the wellpoint system is removed the hydraulic gradient would be from the sand into the landfill. After the site has been developed past the limits of the large sand lens the

wellpoints will not be needed. At locations where silt is present in the side walls the sides should be sloped at a minimum of 2 on 1 and the excavating should be done carefully because saturated silt can behave in a "quick" manner if agitated. Where clay is present in the side walls the rate of surface evaporation should keep pace with the rate of infiltration except during wet weather. The landfill should be constructed so as to provide for drainage along the bottom surface. This could be accomplished by constructing the fill in a relatively continuous manner. An alternate method would be to leave clay walls between the cells and to provide for drainage passages between the cells. A drain tile system may be required at the base of the fill. The basal surface of the pit does not necessarily have to be graded exactly toward the final discharge area. If the water level in the fill can be maintained at a lower elevation than the zone of saturation in the surrounding clay, then the direction of ground water flow will be from the surrounding soil into the fill and no migration of leachate into the ground water can occur. Because the slope of the ground surface away from the site is relatively slight it will probably be necessary to install a lift station to lower the water level at the East end of the landfill to a suitable elevation.

It is recommended that as each new area is opened up, auger borings be made on the bottom to prove out the bottom clay layer.

Any appurtenant structures can be placed on normal spread footings using a design bearing value of 3000 pounds per square foot. Prior to the placement of concrete, any surface water should be pumped out and all loose or saturated material should be removed.

We are available to review this report with you at your convenience.

Report prepared by:

William F. Dilon Jr.
Engineering Geologist

Lawrence A. DuBose

Lawrence A. DuBose,
Registered Structural Engineer
Illinois, No. 2421

APPENDIX

ASTM D 1586-67 "Standard Method for PENETRATION TEST AND SPLIT-BARREL SAMPLING OF SOILS"

LEGEND FOR BORING LOGS

BORING LOGS Numbers 1-8, inclusive

PIEZOMETRIC SURFACE

BORING LOCATIONS

CROSS SECTIONS

Standard Method for

PENETRATION TEST AND SPLIT-BARREL SAMPLING OF SOILS[1]

ASTM Designation: D 1586 - 67

This Standard of the American Society for Testing and Materials is issued under the fixed designation D 1586; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval.

1. Scope

1.1 This method describes a procedure for using a split-barrel sampler to obtain representative samples of soil for identification purposes and other laboratory tests, and to obtain a measure of the resistance of the soil to penetration of the sampler.

2. Apparatus

2.1 *Drilling Equipment*—Any drilling equipment shall be acceptable that provides a reasonably clean hole before insertion of the sampler to ensure that the penetration test is performed on undisturbed soil, and that will permit the driving of the sampler to obtain the sample and penetration record in accordance with the procedure described in 3. Procedure. To avoid "whips" under the blows of the hammer, it is recommended that the drill rod have a stiffness equal to or greater than the A-rod. An "A" rod is a hollow drill rod or "steel" having an outside diameter of $1\frac{5}{8}$ in. or 41.2 mm and an inside diameter of $1\frac{1}{8}$ in. or 28.5 mm, through which the rotary motion of drilling is transferred from the drilling motor to the cutting bit. A stiffer drill rod is suggested for holes deeper than 50 ft (15 m). The hole shall be limited in diameter to between $2\frac{1}{4}$ and 6 in. (57.2 and 152 mm).[2]

2.2 *Split-Barrel Sampler*—The sampler shall be constructed with the dimensions indicated in Fig. 1. The drive shoe shall be of hardened steel and shall be replaced or repaired when it becomes dented or distorted. The coupling head shall have four $\frac{1}{2}$-in. (12.7-mm) (minimum diameter) vent ports and shall contain a ball check valve. If sizes other than the 2-in. (50.8-mm) sampler are permitted, the size shall be conspicuously noted on all penetration records.

2.3 *Drive Weight Assembly*—The assembly shall consist of a 140-lb (63.5-kg) weight, a driving head, and a guide permitting a free fall of 30 in. (0.76 m). Special precautions shall be taken to ensure that the energy of the falling weight is not reduced by friction between the drive weight and the guides.

2.4 *Accessory Equipment*—Labels, data sheets, sample jars, paraffin, and other necessary supplies should accompany the sampling equipment.

3. Procedure

3.1 Clear out the hole to sampling elevation using equipment that will ensure that the material to be sampled is not disturbed by the operation. In saturated sands and silts withdraw the drill bit slowly to prevent loosening of the soil around the hole. Maintain the water level in the hole at or above ground water level.

3.2 In no case shall a bottom-discharge bit be permitted. (Side-discharge bits are permissible.) The process of jetting through an open-tube sampler and then sampling when the desired depth is reached shall not be permitted. Where casing is used, it may not be driven below sampling elevation. Record any loss of circulation or excess pressure in drilling fluid during advancing of holes.

3.3 With the sampler resting on the bottom of the hole, drive the sampler with blows from the 140-lb (63.5-kg) hammer falling 30 in. (0.76 m) until either 18 in. (0.45 m) have been penetrated or 100 blows have been applied.

3.4 Repeat this operation at intervals not longer than 5 ft (1.5 m) in homogeneous strata and at every change of strata.

3.5 Record the number of blows required to effect each 6 in. (0.15 m) of penetration or fractions thereof. The

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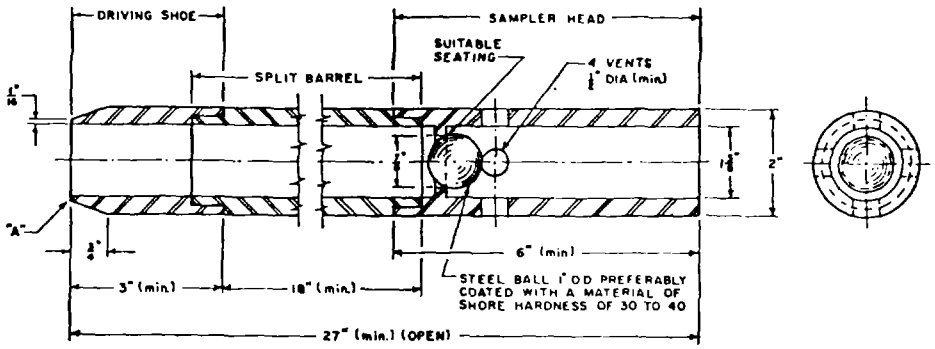
[1] Under the standardization procedure of the Society, this method is under the jurisdiction of the ASTM Committee D-18 on Soil and Rock for Engineering Purposes. A list of members may be found in the ASTM Year Book.

Current edition accepted Oct. 20, 1967. Originally issued 1958. Replaces D 1586 - 64 T.

[2] Hvorslev, M. J., *Surface Exploration and Sampling of Soils for Civil Engineering Purposes*, The Engineering Foundation, 345 East 47th St., New York, N. Y. 10017.



NOTE 1—Split barrel may be 1½ in. inside diameter provided it contains a liner of 16-gage wall thickness.

NOTE 2—Core retainers in the driving shoe to prevent loss of sample are permitted.

NOTE 3—The corners at *A* may be slightly rounded.

TABLE OF METRIC EQUIVALENTS

in.	mm	cm	in.	mm	cm
1/16 (16 gage)	1.5	...	2	...	5.08
½	12.7	...	3	...	7.62
¾	19.0	1.90	6	...	15.24
⅞	22.2	2.22	18	...	45.72
1⅜	34.9	3.49	27	...	68.58
1½	38.1	3.81			

FIG. 1—Standard Split Barrel Sampler Assembly

first 6 in. (0.15 m) is considered to be a seating drive. The number of blows required for the second and third 6 in. (0.15 m) of penetration added is termed the penetration resistance, *N*. If the sampler is driven less than 18 in. (0.45 m), the penetration resistance is that for the last 1 ft (0.30 m) of penetration (if less than 1 ft (0.30 m) is penetrated, the logs shall state the number of blows and the fraction of 1 ft (0.30 m) penetrated).

3.6 Bring the sampler to the surface and open. Describe carefully typical samples of soils recovered as to composition, structure, consistency, color, and condition; then put into jars without ramming. Seal them with wax or hermetically seal to prevent evaporation of the soil moisture. Affix labels to the jar or make notations on the covers (or both) bearing job designation, boring number, sample number, depth penetration record, and length of recovery. Protect samples against extreme temperature changes.

4. Report

4.1 Data obtained in borings shall be recorded in the field and shall include the following:

4.1.1 Name and location of job,

4.1.2 Date of boring—start, finish,

4.1.3 Boring number and coordinate, if available,

4.1.4 Surface elevation, if available,

4.1.5 Sample number and depth,

4.1.6 Method of advancing sampler, penetration and recovery lengths,

4.1.7 Type and size of sampler,

4.1.8 Description of soil,

4.1.9 Thickness of layer,

4.1.10 Depth to water surface; to loss of water; to artesian head; time at which reading was made,

4.1.11 Type and make of machine,

4.1.12 Size of casing, depth of cased hole,

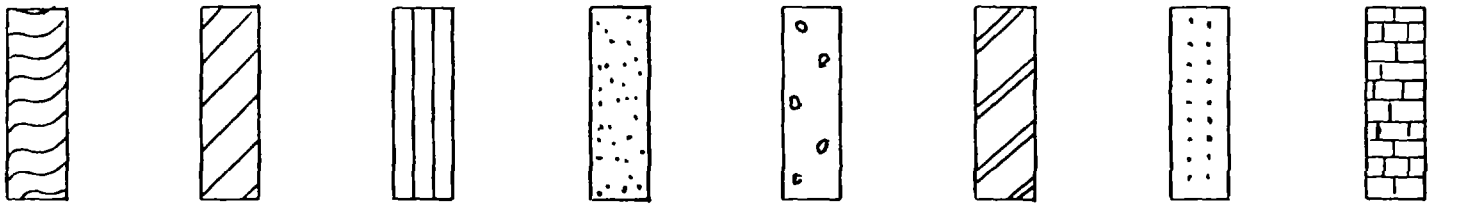
4.1.13 Number of blows per 6 in. (0.15 m),

4.1.14 Names of crewmen, and

4.1.15 Weather, remarks.

TESTING SERVICE CORPORATION

LEGEND FOR BORING LOGS



PEAT and ORGANIC SOIL | CLAY | SILT | SAND | GRAVEL | SHALE | SANDSTONE | LIMESTONE

ST = Shelby Tube Sample SS = Split Spoon Sample γ_{dry} = Dry unit weight in pounds per cubic foot

A = Auger Sample WC = In situ water content

N = Penetration Resistance in Blows per Foot - by driving 2" O. D. Split Spoon Sampler a distance of 12 inches with a 140-pound weight freely falling 30 inches

▽ = water level at end of boring ▼ = water level after elapsed time interval

Q_u = Unconfined compression strength in Tons per Square Foot

* = Denotes strength was based on pocket penetrometer measurements. Maximum range = 5.0

MATERIAL	SIZE RANGE
BOULDER	Over 8 inches
COBBLE	8 inches to 2-1/2 inches
Coarse GRAVEL	2-1/2 inches to 1 inch
Medium GRAVEL	1 inch to 3/8 inch
Small GRAVEL	3/8 inch to No. 4 sieve
Coarse SAND	No. 4 sieve to No. 20 sieve
Medium SAND	No. 20 sieve to No. 60 sieve
Fine SAND	No. 60 sieve to No. 200 sieve
SILT or CLAY	Finer than No. 200 sieve

COHESIVE SOILS (over 30 per cent CLAY by weight)

Classification	Q_u
Very Soft	0.35
Soft	0.35 to 0.59
Stiff	0.60 to 0.99
Tough	1.00 to 1.99
Very Tough	2.00 to 3.99
Hard	4.00 and over

Term	Per Cent by Weight
CLAY	over 50 (no modifiers)
CLAY	30 to 50 (modifier - Silty, Sandy, Gravelly)

COHESIONLESS SOILS (less than 30 per cent CLAY by weight)

Classification	N
Very Loose	0 - 4
Loose	5 - 9
Firm	10 - 29
Dense	30 - 49
Very Dense	50 and over

Term	Per Cent by Weight
SILT, SAND or GRAVEL	Major portion (with modifier)
Silty, Sandy, Gravelly	35 to 50
Clayey	20 to 30

Modifying Term	Per Cent by Weight
Trace	1 - 10
Little	10 - 20
Some	20 - 35
And	35 - 50

PROJECT PROPOSED WASTE MANAGEMENT LANDFILL SITE, NEAR KANKAKEE, ILLINOIS

CLIENT GEOTECH, INC., 224 North Broadway, Joliet, Illinois

BORING 1 DATE STARTED 2-19-73 DATE COMPLETED 2-19-73 JOB L-10,47

ELEVATIONS

GROUND SURFACE 655.1

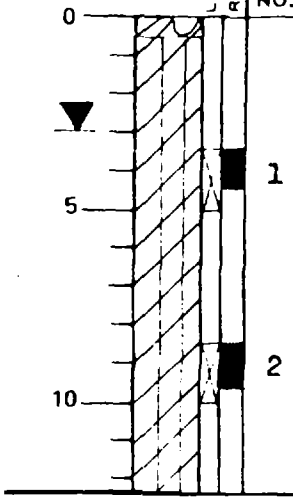
END OF BORING 603.1

WATER TABLE

AT END OF BORING

24 HOURS - 3.0'

Water encountered at -37.0' while drilling



LENGTH RECOVERY	SAMPLE NO.	TYPE	N	WC	Q_u	%DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.5	654.6	Black clayey TOPSOIL, moist
	1	SS	10	23.6	2.75*				Very tough to hard brown and gray silty CLAY, moist
	2	SS	19	20.8	4.17 4.5+*				

PROJECT PROPOSED WASTE MANAGEMENT LANDFILL SITE, NEAR KANKAKEE, ILLINOIS

CLIENT GEOTECH, INC., 224 North Broadway, Joliet, Illinois

BORING 2 DATE STARTED 2-21-73 DATE COMPLETED 2-21-73 JOB L-10,476

ELEVATIONS

GROUND SURFACE 639.4

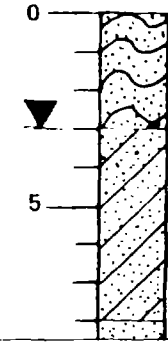
END OF BORING 597.4

WATER TABLE

AT END OF BORING

24 HOURS - 3.0'

Water encountered @ -38.0' while drilling



LENGTH RECOVERY	SAMPLE NO.	TYPE	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
									Black sandy TOPSOIL, moist
							3.0	636.4	
	1	SS	4	24.2					Loose brown and gray clayey SAND, moist
							8.0	631.4	

PROJECT PROPOSED WASTE MANAGEMENT LANDFILL SITE, NEAR KANKAKEE, ILLINOIS

CLIENT GEOTECH, INC., 224 North Broadway, Joliet, Illinois

BORING 3 DATE STARTED 2-21-73 DATE COMPLETED 2-22-73 JOB L-10,476

ELEVATIONS

GROUND SURFACE 693.3

END OF BORING 591.8

WATER TABLE

AT END OF BORING

24 HOURS - 7.0'

Water encountered at -25.0' while drilling

Distance Below Surface in Feet

SAMPLE NO.	TYPE	LENGTH RECOVERY	N	WC	Q_u	%DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
									Black and brown clayey TOPSOIL, moist
1	SS		6	25.0	1.5*		3.0	690.3	
									Tough brown silty CLAY, little sand, moist
2	SS		18				8.0	685.3	
									Firm brown SILT, trace fine sand, moist
3	SS		16	14.2	2.75*		14.0	679.3	
									Very tough gray silty CLAY, trace sand, moist
4	SS		29				18.0	675.3	
									Firm gray SILT, little sand, moist
5	SS		25				23.0	670.3	
									Firm gray silty SAND, very moist
6	SS		22						
7	SS		27				33.0	660.3	
									Firm gray SILT, trace sand and clay, saturated
8	SS		23						
9	SS		14						
10	SS		20						
11	SS		17				53.0	640.3	
									Firm gray silty fine SAND, saturated
12	SS		22						
13	SS		14				64.0	629.3	
									Firm gray SILT, saturated
14	ST				2.38		69.0	624.3	
15	SS		47	18.2	3.0*				Very tough to hard gray silty CLAY, trace sand, moist

PROJECT PROPOSED WASTE MANAGEMENT LANDFILL SITE, NEAR KANKAKEE, ILLINOIS

CLIENT GEOTECH, INC., 224 North Broadway, Joliet, Illinois

BORING 4 DATE STARTED 4-6-73 DATE COMPLETED 4-6-73 JOB L-10,476

ELEVATIONS

GROUND SURFACE 679.4

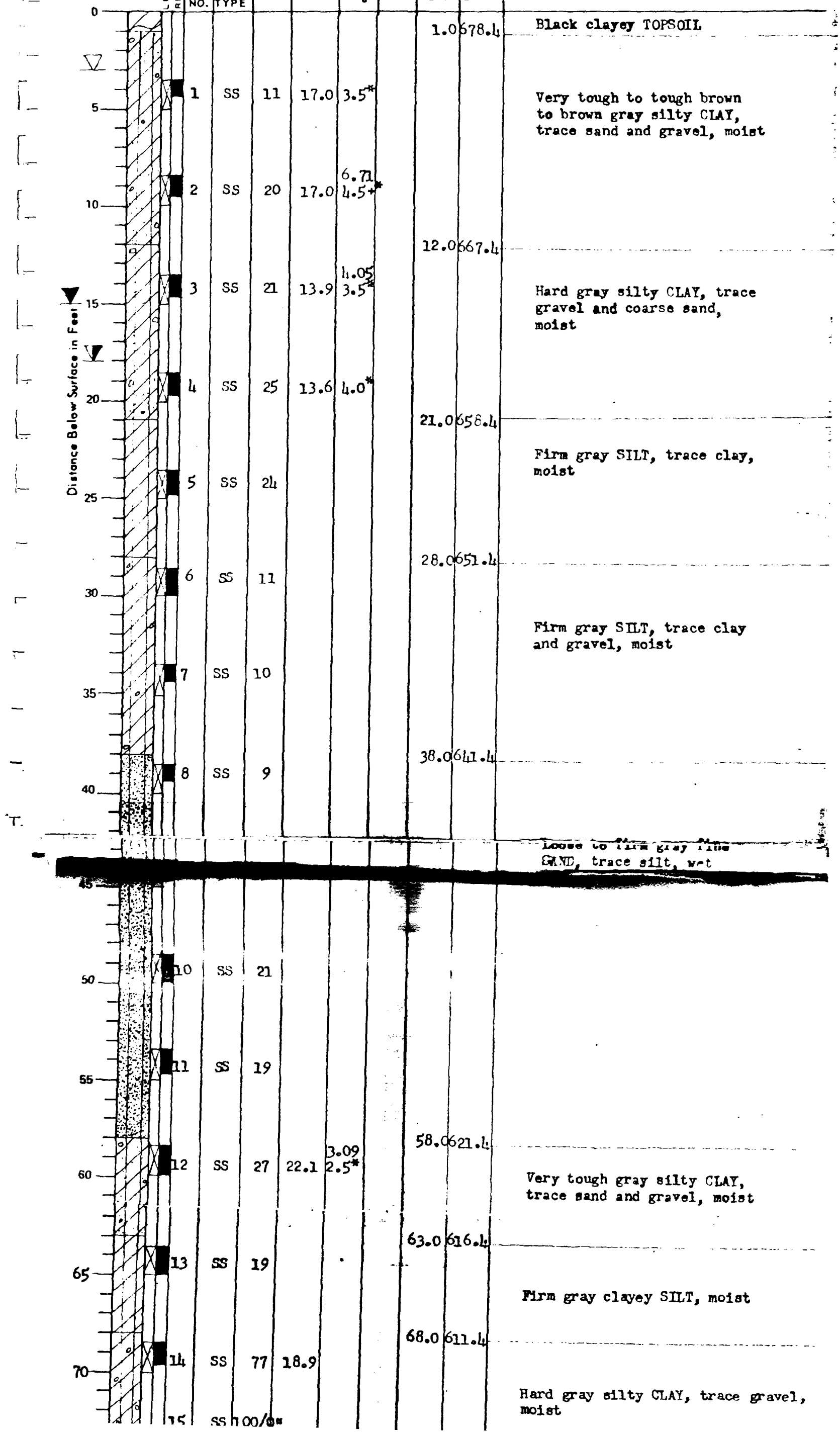
END OF BORING 606.4

WATER TABLE

AT END OF BORING -3.0'

24 HOURS

Water encountered at -18.0' while drilling



LENGTH RECOVERY	SAMPLE NO.	TYPE	N	WC	Q_u	% DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
							1.0	678.4	Black clayey TOPSOIL
	1	SS	11	17.0	3.5*				Very tough to tough brown to brown gray silty CLAY, trace sand and gravel, moist
	2	SS	20	17.0	6.71 4.5+*				
							12.0	667.4	
	3	SS	21	13.9	4.05 3.5*				Hard gray silty CLAY, trace gravel and coarse sand, moist
	4	SS	25	13.6	4.0*		21.0	658.4	
	5	SS	24						Firm gray SILT, trace clay, moist
	6	SS	11				28.0	651.4	
	7	SS	10						Firm gray SILT, trace clay and gravel, moist
	8	SS	9				38.0	641.4	
									Loose to firm gray fine SAND, trace silt, wet
	10	SS	21						
	11	SS	19						
	12	SS	27	22.1	3.09 2.5*		58.0	621.4	Very tough gray silty CLAY, trace sand and gravel, moist
	13	SS	19				63.0	616.4	Firm gray clayey SILT, moist
	14	SS	77	18.9			68.0	611.4	Hard gray silty CLAY, trace gravel, moist
	15	SS	100/0"						

PROJECT PROPOSED WASTE MANAGEMENT LANDFILL SITE, NEAR KANKAKEE, ILLINOIS

CLIENT GEOTECH, INC., 224 North Broadway, Joliet, Illinois

BORING 5 DATE STARTED 4-17-73 DATE COMPLETED 4-17-73 JOB L-10,476

ELEVATIONS

GROUND SURFACE 651.9

END OF BORING 603.3

WATER TABLE

AT END OF BORING -8.0'

24 HOURS -5.0'

Water encountered at -28.0' while drilling

Distance Below Surface in Feet	LENGTH RECOVERY	SAMPLE NO.	TYPE	N	WC	Q_u	DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
0		1	SS	6				1.1	650.8	Dark brown sandy TOPSOIL, moist
5		2	SS	7						Loose brown fine SAND, moist to wet
		3	SS	8				7.5	644.4	
10		4	SS	4						
		5	SS	4						
15		6	SS	4						Loose gray SILT, saturated
20		7	SS	4						
25		8	SS	4						
30		9	SS	15	17.2	1.5*		29.0	622.9	
35		10	SS	42	18.3	5.47 4.5+*				Tough to hard gray silty CLAY, trace gravel, moist
40		11	SS	28	18.8	2.0*				
45		12	SS	40	18.5	7. 4.5+		48.0	605.9	
		13	SS	50/1"						Broken rock or boulder
50										Auger Refusal at 48.6 feet due to Boulder or top of Limestone.
55										
60										
65										
70										

* - Approximate unconfined compression strength based on measurements with a calibrated pocket penetrometer

TESTING SERVICE CORPORATION

DRILL RIG NO 60

PROJECT PROPOSED WASTE MANAGEMENT LANDFILL SITE, NEAR KANKAKEE, ILLINOIS

CLIENT GEOTECH, INC., 224 North Broadway, Joliet, Illinois

BORING 6 DATE STARTED 4-18-73 DATE COMPLETED 4-18-73 JOB L-10,476

ELEVATIONS

GROUND SURFACE 644.8

END OF BORING 596.0

WATER TABLE

AT END OF BORING -3.5'

24 HOURS -1.5'

Water encountered at -3.5' while drilling

SAMPLE NO.	TYPE	LENGTH RECOVERY	N	WC	Q_u	%DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
							1.0	643.8	Black clayey TOPSOIL, moist
1	SS		3	24.2	0.75*				Stiff brown silty CLAY, very moist
							3.2	641.6	
2	SS		8						
3	SS		21						Loose to dense brown fine SAND, wet
4	SS		40						
							10.5	634.3	
5	SS		16	17.3	4.5*				
6	SS		15	16.9	4.28 4.5*				
7	SS		20	16.6	1.75*				Tough to hard gray silty CLAY, trace gravel, moist
8	SS		20	19.5	2.98 2.5*				
9	SS		26	18.5	3.81 3.25*				
10	SS		36	18.5 19.0	4.5+* 2.0*				
11	SS		41	20.4	4.5+*				
							41.0	603.8	
12	SS		62						Hard gray, moist
							47.0	597.8	
13	SS		75/2"						Broken rock or boulder

Auger Refusal at 48.8 feet due to Boulder or top of Limestone.

* - Approximate unconfined compression strength based on measurements with a calibrated pocket penetrometer

Distance Below Surface in Feet

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70

DRILL RIG NO. 53

TESTING SERVICE CORPORATION

PROJECT PROPOSED WASTE MANAGEMENT LANDFILL SITE, NEAR KANKAKEE, ILLINOIS

CLIENT GEOTECH, INC., 224 North Broadway, Joliet, Illinois

BORING 7 DATE STARTED 4-17-73 DATE COMPLETED 4-17-73 JOB 1-10,476

ELEVATIONS

GROUND SURFACE 649.3

END OF BORING 584.8

WATER TABLE

AT END OF BORING -1.0'

24 HOURS Covered

Water encountered at -5.0' while drilling

Distance Below Surface in Feet

SAMPLE NO.	TYPE	LENGTH RECOVERY	N	WC	Q_u	DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
							1.0	648.3	Dark brown silty TOPSOIL, moist
1	SS		11						Loose brown to gray fine SAND, wet
2	SS		7						
3	SS		6				7.5	641.8	
4	SS		9	14.6	3.5*				Very tough to hard gray silty CLAY, trace gravel, moist
5	SS		20	16.3	6.12 4.5+*				
6	SS		15	12.8	4.5+*		15.0	634.3	
									Firm gray SILT, moist
7	SS		24				20.0	629.3	
8	SS		22	15.2	2.27 2.5*				Tough to very tough gray silty CLAY, trace gravel, moist
9	SS		21	18.0	1.75*				
10	SS		21	15.0	3.46 3.0*				
11	SS		22	16.9	1.5*				
12	SS		20	14.8	2.5*				
13	SS		46	8.9	4.5+*		48.5	600.8	
14	SS		68	8.5	14.27 4.5+*				- Hard gray silty CLAY, trace gravel, moist
15	SS		81	8.7	4.5+*				
							62.0	587.3	Gray GRAVEL and Broken ROCK
16	SS		85/3"				63.5	585.8	Boulder or Bedrock

Auger Refusal at 64.5 feet due to Boulder or top of Limestone.

* - Approximate unconfined compression strength based on measurements with a calibrated pocket penetrometer

TESTING SERVICE CORPORATION

DRILL RIG NO 60

PROJECT PROPOSED WASTE MANAGEMENT LANDFILL SITE, NEAR KANKAKEE, ILLINOIS

CLIENT GEOTECH, INC., 224 North Broadway, Joliet, Illinois

BORING 8 DATE STARTED 4-18-73 DATE COMPLETED 4-18-73 JOB L-10,476

ELEVATIONS

GROUND SURFACE 642.0

END OF BORING 583.4

WATER TABLE

AT END OF BORING -4.5'

24 HOURS -3.0'

Water encountered at -5.0' while drilling

Distance Below Surface in Feet

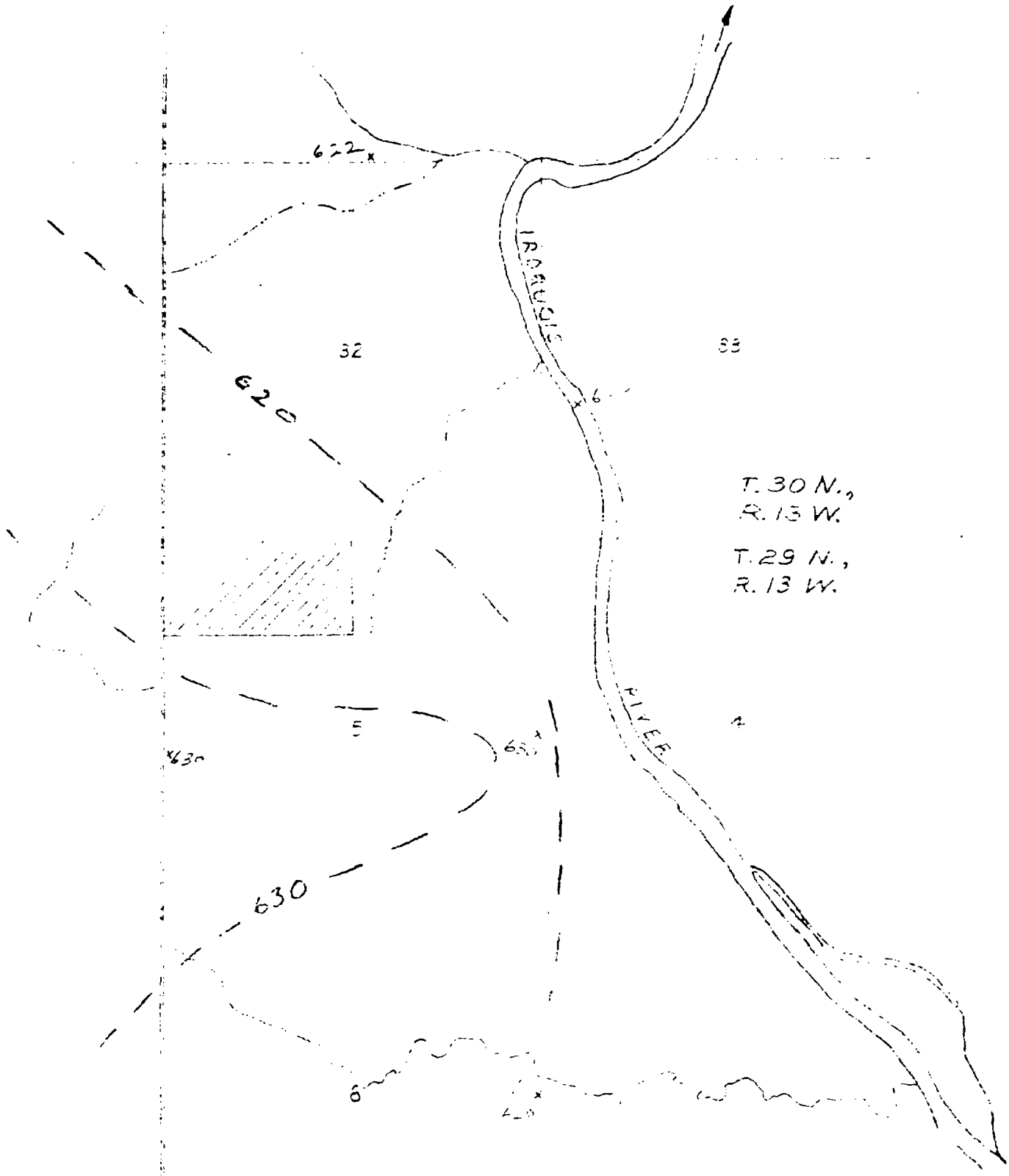
SAMPLE NO.	TYPE	N	WC	Q_u	DRY	DEPTH	ELEV.	SOIL DESCRIPTIONS
1	SS	6	14.3			1.5	640.5	Dark brown sandy TOPSOIL, moist
2	SS	8						Loose brown fine SAND, moist to wet
3	SS	5						
						8.0	634.0	
4	SS	18						Firm gray silty SAND, wet
5	SS	10	23.0	1.90 2.0*		12.2	629.8	
6	SS	7	27.5	2.62 3.0*				
a			26.3	2.0*				Very tough gray silty CLAY, trace gravel, moist
7b	SS	16	16.7	1.5*				
8	SS	17	19.0	2.49 2.75*				
						28.0	614.0	
9	SS	27	19.5	3.5*				
10	SS	24	20.7	4.71 4.25*				Hard gray silty CLAY, trace sand and gravel, moist
11	SS	28	21.2	4.25*				
						42.0	600.0	
12	SS	50						Dense gray clayey SILT, moist
						48.0	594.0	
13	SS	40						Dense gray SILT, moist
						53.0	589.0	
14	SS	50/1"						Very dense gray fine to coarse SAND, little gravel, trace silt, with boulders, moist
15	SS	75/1"				58.5	583.5	Bedrock or Boulder

Auger Refusal at 58.6 feet due to Boulder or Top of Limestone.

* - Approximate unconfined compression strength based on measurements with a calibrated pocket penetrometer

TESTING SERVICE CORPORATION

DRILL RIG NO 60



Piezometric Surface